

**IN THE EUROPEAN PATENT OFFICE INTERNATIONAL PRELIMINARY
EXAMINING AUTHORITY (IPEA/EP)**

Applicant(s): DOW GLOBAL TECHNOLOGIES INC.

Mark Sonnenschein et al.

International Application No.: PCT/US2005/004097

Filed: 10 February 2005

For: AQUEOUS-BASED ADHESIVE FOR BONDING LOW SURFACE
ENERGY SUBSTRATES

REFERENCE: 63344A

Authorized Officer: Laurent Tissot

RESPONSE TO WRITTEN OPINION

Dear Sir/Madam:

This is in response to the Written Opinion of the International Searching Authority mailed 27 May 2005 and is being filed together with the Demand for Chapter II examination.

The pending claims were rejected as lacking novelty and inventive step over D1. The inventors of the pending claims discovered a method where water could be used as a carrier for a protected alkyl borane complex in a first part of a two-part adhesive system.

Specifically, applicants learned that generally use of water as a carrier was not viable because water attacked the alkylborane complex. However, applicants further discovered that addition of a neutral or basic surfactant or a combination thereof enabled use of the water in the first part with the alkylborane.

D1 is a method of bonding two substrates using a composition having an organoborane/amine complex; a monomer, oligomer, or polymer with olefinic unsaturation; and a third component which is either a compound which causes the complex to disassociate or a heating step which causes the complex to disassociate. In D1, the adhesive composition is taught to be potentially useful as either one part or two part adhesive. While D1 mentions that a carrier which is water or a solvent may be used, D1 contains no examples using water as a carrier. Moreover, D1 never

teaches or suggests use of a non-acidic surfactant in combination with the organoborane/amine complex and water as a carrier.

The general teachings of D1 do not negate the patentability of the present invention. In fact, Applicants have learned that water is generally not suitable as a carrier for the alkylborane complex because the water attacks and dissociates the complex. See the attached analytical report indicating that upon combination of water and the trialkylborane amine complex, a reaction occurred resulting in substantial loss of the complex – note the difference in ratio area counts of TBB/amine when in acetonitrile as solvent versus when in a water or a water/solvent blend.

It is only when a neutral or basic surfactant is used that the complex becomes stable in water. This specific combination is not taught by D1. Therefore, applicants request reconsideration of the preliminary determination of lack of novelty and inventive step and grant of a positive Examination Report.

A replacement page where claim 1 has been amended to specify that the surfactant is a neutral or basic surfactant or a combination thereof is submitted with this response. Support for that amendment is found at page 3, line 3.

Applicants request reconsideration of this Application and issuance of a positive written opinion in regards to novelty and inventive step.

Respectfully submitted,

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SMZ/jmd

REPLACEMENT PAGE

WHAT IS CLAIMED IS:

1. A 2-part adhesive formulation comprising, in a first part, water, a surfactant which is a neutral or a basic surfactant or a combination thereof, and a protected alkylborane complex and, in a second part, an acrylic monomer and a trialkylborane-displacing initiator.
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2. The formulation of Claim 1 wherein protected alkylborane complex is a trialkylborane-organonitrogen complex the second part further includes an acrylic polymer as a thixotropic agent.
3. The formulation of Claim 2 wherein the thixotropic agent is a poly(methyl methacrylate).
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4. The formulation of Claim 3 wherein the surfactant is a polyvinyl pyrrolidone, a polyetheramine, a polyethylene glycol, a polyethylene glycol-polypropylene glycol copolymer, a polyacrylamide, a hydroxycellulose, a polyvinyl alcohol, a polyacrylic acid salt, or a polymethacrylic acid salt, or a combination thereof.
5. The formulation of Claim 3 wherein the second part of the formulation includes an acrylic monomer selected from the group consisting of hydroxyethyl acrylate, hydroxybutyl methacrylate, and methyl methacrylate; and a trialkylborane initiator selected from the group consisting of acrylic acid and methacrylic acid.
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6. The formulation of Claim 5 wherein the acrylic monomer includes methyl methacrylate and the trialkylborane initiator includes acrylic acid.
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7. A 2-part adhesive formulation comprising, in a first part, water, a surfactant, and a trialkylborane-organonitrogen complex and, in a second part, methyl methacrylate, a thixotropic agent, and a trialkylborane-displacing initiator selected from the group consisting of acrylic acid, methacrylic acid, and a 2-hydroxyalkyl acrylate.
8. The 2-part adhesive of Claim 7, which includes in either the first or second part or both a pigment, a dye, a filler, or an antioxidant, or a combination thereof.
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